TEXAS AGRICULTURAL EXPERIMENT STATION

A. B. CONNER, DIRECTOR

COLLEGE STATION, BRAZOS COUNTY, TEXAS

BULLETIN NO. 381 MAY, 1928

DIVISION OF AGRONOMY

PEANUTS IN TEXAS

AGRICULTURAL AND MECHANICAL COLLEGE OF TEXAS

T. O. WALTON, President

STATION STAFF†

ADMINISTRATION:
A. B. CONNER, M. S., *Director*
R. E. KARPER, M. S., *Acting Vice-Director*
J. M. SCHAEDEL, *Secretary*
M. P. HOLLEMAN, JR., *Chief Clerk*
J. K. FRANCKLOW, *Assistant Chief Clerk*
CHESTER HIGGS, *Executive Assistant*
C. B. NEBLETTE, *Technical Assistant*

CHEMISTRY:
G. S. FRAPS, Ph. D., *Chief; State Chemist*
S. E. ASBURY, M. S., *Assistant Chemist*
E. C. CARLYLE, B. S., *Chemist*
WALDO H. WALKER, *Assistant Chemist*
VELMA GRAHAM, *Assistant Chemist*
R. O. BROOKE, M. S., *Assistant Chemist*
T. L. OGIER, B. S., *Assistant Chemist*
J. G. EVANS, *Assistant Chemist*
ATHAN J. STERGES, B. S., *Assistant Chemist*
G. S. CRENSHAW, A. B., *Assistant Chemist*
JEANNE M. FUEGAS, *Assistant Chemist*

HORTICULTURE:
HAMILTON P. TRAUB, Ph. D., *Chief*
H. NESS, M. S., *Berry Breeder*

RANGE ANIMAL HUSBANDRY:
J. M. JONES, A. M., *Chief; Sheep and Goat Investigations*
J. L. LUSH, Ph. D., *Animal Husbandman; Breeding Investigations*
STANLEY P. DAVIS, *Wool Grader*

ENTOMOLOGY:
F. L. THOMAS, Ph. D., *Chief; State Entomologist*
H. J. REINHARD, B. S., *Entomologist*
R. K. FLETCHER, M. A., *Entomologist*
W. L. OWEN, JR., M. S., *Entomologist*
FRANK M. HULL, M. S., *Entomologist*
J. C. GAINES, JR., M. S., *Entomologist*
C. J. TODD, B. S., *Entomologist*
F. F. BIBBY, B. S., *Entomologist*
S. E. MCGREGOR, JR., *Acting Chief Foulbrood Inspector*
A. B. KENNERLY, *Foulbrood Inspector*
GILLIS GRAHAM, *Foulbrood Inspector*

AGRONOMY:
E. B. REYNOLDS, M. S., *Chief*
A. B. CONNER, M. S., *Agronomist; Grain Sorghum Research*
R. E. KARPER, M. S., *Agronomist; Small Grain Research*
P. C. MANGELSDORF, Sc. D., *Agronomist; in charge of Corn and Small Grain Investigations*
D. T. KILLOUGH, M. S., *Agronomist; Cotton Breeding*
H. E. REA, B. S., *Agronomist; Cotton Root Rot Investigations*
E. C. CUSHING, B. S., *Assistant in Crops*
P. R. JOHNSON, B. S., *Assistant in Soils*

VETERINARY SCIENCE:
*M. FRANCIS, D. V. M., *Chief*
H. SCHMIDT, D. V. M., *Veterinarian*
J. D. JONES, D. V. M., *Veterinarian*

PLANT PATHOLOGY AND PHYSIOLOGY:
J. J. TAUBENHAUS, Ph. D., *Chief*
L. J. PESSIN, Ph. D., *Plant Pathologist and Laboratory Technician*
W. J. BACH, M. S., *Plant Pathologist*
J. PAUL LUSK, S. M., *Plant Pathologist*
B. F. DANA, M. S., *Plant Pathologist*

FARM AND RANCH ECONOMICS:
L. P. GABBARD, M. S., *Chief*
G. L. CRAWFORD, M. S., *Marketing Research Specialist*
C. A. BONNEN, M. S., *Farm Management Research Specialist*
V. L. CORY, M. S., *Grazing Research Botanist*
**T. L. GASTON, JR., B. S., *Assistant; Farm Records and Accounts*
**J. N. TATE, B. S., *Assistant; Ranch Records and Accounts*

RURAL HOME RESEARCH:
JESSIE WHITACRE, Ph. D., *Chief*
MAMIE GRIMES, M. S., *Textile and Clothing Specialist*
EMMA E. SUMNER, M. S., *Nutrition Specialist*

SOIL SURVEY:
**W. T. CARTER, B. S., *Chief*
E. H. TEMPLIN, B. S., *Soil Surveyor*
T. C. REITCH, B. S., *Soil Surveyor*
HARVEY OAKES, *Soil Surveyor*

BOTANY:
H. NESS, M. S., *Chief*

PUBLICATIONS:
A. D. JACKSON, *Chief*

SWINE HUSBANDRY:
FRED HALE, M. S., *Chief*

DAIRY HUSBANDRY:
_____, *Chief*

POULTRY HUSBANDRY:
R. M. SHERWOOD, M. S., *Chief*

***AGRICULTURAL ENGINEERING:**

MAIN STATION FARM:
G. T. MCNESS, *Superintendent*

APICULTURE (San Antonio):
H. B. PARKS, B. S., *Chief*
A. H. ALEX, B. S., *Queen Breeder*

FEED CONTROL SERVICE:
F. D. FULLER, M. S., *Chief*
S. D. PEARCE, *Secretary*
J. H. ROGERS, *Feed Inspector*
W. H. WOOD, *Feed Inspector*
K. L. KIRKLAND, B. S., *Feed Inspector*
W. D. NORTHCUTT, JR., B. S., *Feed Inspector*
SIDNEY D. REYNOLDS, JR., *Feed Inspector*
P. A. MOORE, *Feed Inspector*

SUBSTATIONS

No. 1, Beeville, Bee County:
R. A. HALL, B. S., *Superintendent*

No. 2, Troup, Smith County:
W. S. HOTCHKISS, *Superintendent*

No. 3, Angleton, Brazoria County:
R. H. STANSEL, M. S., *Superintendent*
FRANK M. HULL, M. S., *Entomologist*

No. 4, Beaumont, Jefferson County:
R. H. WYCHE, B. S., *Superintendent*

No. 5, Temple, Bell County:
HENRY DUNLAVY, M. S., *Superintendent*
B. F. DANA, M. S., *Plant Pathologist*
H. E. REA, B. S., *Agronomist; Cotton Root Rot Investigations*

No. 6, Denton, Denton County:
P. B. DUNKLE, B. S., *Superintendent*

No. 7, Spur, Dickens County:
R. E. DICKSON, B. S., *Superintendent*

No. 8, Lubbock, Lubbock County:
D. L. JONES, *Superintendent*
FRANK GAINES, *Irrigationist and Forest Nurseryman*

No. 9, Balmorhea, Reeves County:
J. J. BAYLES, B. S., *Superintendent*

No. 10, Feeding and Breeding Station, near College Station, Brazos County:
R. M. SHERWOOD, M. S., *Animal Husbandman in Charge of Farm*
L. J. MCCALL, *Farm Superintendent*

No. 11, Nacogdoches, Nacogdoches County:
H. F. MORRIS, M. S., *Superintendent*

No. 12, Chillicothe, Hardeman County:
**J. R. QUINBY, B. S., *Superintendent*
**J. C. STEPHENS, M. A., *Junior Agronomist*

No. 14, Sonora, Sutton-Edwards Counties:
W. H. DAMERON, B. S., *Superintendent*
E. A. TUNNICLIFF, D. V. M., M. S., *Veterinarian*
V. L. CORY, M. S., *Grazing Research Botanist*
**O. G. BABCOCK, B. S., *Collaborating Entomologist*
O. L. CARPENTER, *Shepherd*

No. 15, Weslaco, Hidalgo County:
W. H. FRIEND, B. S., *Superintendent*
SHERMAN W. CLARK, B. S., *Entomologist*
W. J. BACH, M. S., *Plant Pathologist*

No. 16, Iowa Park, Wichita County:
E. J. WILSON, B. S., *Superintendent*
J. PAUL LUSK, S. M., *Plant Pathologist*

Teachers in the School of Agriculture Carrying Cooperative Projects on the Station:

G. W. ADRIANCE, M. S., *Associate Professor of Horticulture*
S. W. BILSING, Ph. D., *Professor of Entomology*
V. P. LEE, Ph. D., *Professor of Marketing and Finance*
D. SCOATES, A. E., *Professor of Agricultural Engineering*
H. P. SMITH, M. S., *Associate Professor of Agricultural Engineering*
R. H. WILLIAMS, Ph. D., *Professor of Animal Husbandry*
A. K. MACKEY, M. S., *Associate Professor of Animal Husbandry*
J. S. MOGFORD, M. S., *Associate Professor of Agronomy*

†As of May 1, 1928. *Dean, School of Veterinary Medicine.
**In cooperation with U. S. Department of Agriculture.
***In cooperation with the School of Agriculture.

SYNOPSIS

Peanuts had not been an important commercial crop in Texas until the war-time demand for vegetable oils brought the crop into prominence, and in 1918 a peak of 7,117,000 bushels was reported, which declined in 1926 to 1,644,833 bushels. The principal demand at present is for shelled peanuts, which are used in the production of peanut butter, confections, and for roasting.

Approved methods of planting, cultivation, harvesting, and curing are discussed. Experiments at Beeville and Lubbock indicate that close planting from three to six inches in the row, will produce larger yields of both forage and nuts than when a greater distance is given between plants in the row.

The culture of peanuts is adapted to the sandy soils of the State, and fits well into a crop rotation. Peanuts produce forage comparable with the clovers as a feed for dairy cattle. Peanuts also make good feed for hogs, but when the nuts are not properly fed, either whole or as meal, they frequently produce a condition known as soft pork which is penalized by the packing trade.

There is practically no difference in the yields of peanuts, when planted in the hull, or where the hull is broken or cracked. Peanuts produce higher yields of forage when planted in thirty-six-inch rows, but higher yields of nuts are obtained when planted in eighteen-inch rows.

The Macspan peanut, a selection by the Texas Agricultural Experiment Station from the Little Spanish variety, matures earlier, is more productive and uniform, and the kernels probably contain a higher percentage of oil than the common Spanish peanut.

CONTENTS

BULLETIN NO. 381 MAY, 1928

PEANUTS IN TEXAS

GEO. T. McNESS

Only within the past ten years has the peanut become a commercial crop in Texas. Previously peanuts were grown only on small areas for home consumption; either for household purposes, or for feeding hogs which were to be killed for the home supply of meat.

The only direct sales made were those to other farmers, and for planting seed, which was sometimes paid for in trade.

With the advent of the European war, a demand was created for all kinds of vegetable oils and animal fats. The peanut was recognized as a valuable source of vegetable oil, and the high quality of this oil, together with its pleasant flavor, made it possible to manufacture it as a food in various forms; and the kernels have become increasingly popular in the manufacture of peanut butter, confections, and for roasting.

Machinery for hulling the nuts and extracting the oil was installed in many of the cotton oil mills of the State, and the market conditions during this period stimulated the farmers to increased acreages.

With the close of the war, and the readjustment of trade conditions during the years 1920 and 1921, the price of peanuts to the farmer fell from $2.38 for a bushel of 30 pounds in 1919, to $1.02 a bushel in 1921. From that time, the acreage of peanuts in the State shows a gradual decline, with a fluctuation in price from $1.92 to $1.02 a bushel, until 1926, when both the acreage and the price advanced. The comparatively high price of cotton during this period probably had some effect on peanut production.

Of the twelve States in which peanuts are considered one of the principal crops, Texas was fifth in 1926, with a yield of 49,345,000 pounds with a farm value of $2,220,525 produced on 71,000 acres. Georgia, North Carolina, Alabama, and Virginia having larger acreages in the order in which they are named.

Table 1. Peanut production in Texas, 1918 to 1926. (U. S. Dept. of Agr. Yearbook.)

Year	Acres	Yield in Bushels	Farm Value in Dollars	
			Total	Per Bushel
1918	647,000	7,117,000	$ 14,661,000	$ 2.05
1919	222,000	5,550,000	13,209,000	2.38
1920	174,000	4,176,000	7,517,000	1.80
1921	195,000	4,127,500	4,210,000	1.02
1922	172,000	3,210,666	3,853,000	1.20
1923	122,000	2,521,333	4,841,000	1.92
1924	75,000	1,125,000	1,519,000	1.35
1925	65,000	1,094,166	1,116,049	1.02
1926	71,000	1,644,833	2,220,524	1.35

During the year of 1926, the United States produced 626,866,000 pounds of peanuts, with a farm value of $28,208,970. From this yield there were exported 3,489,000 pounds, leaving 623,377,000 pounds that were consumed at home. Importations that year were 120,158,000 pounds of peanuts, mostly from China, British India, and Senegal, bringing the total consumption of peanuts in the United States for the year to 743,535,000 pounds.

SOIL AND CLIMATIC ADAPTATION

The peanut is a plant of tropical origin, and therefore grows best where the season is long and warm, with ample rainfall. It will adapt itself to a wide range of climate and soils, but in Texas grows best on the sandy and sandy loam soils, of which the finer textures prevail in the State.

There are two principal regions of the State in which the peanut is grown on a commercial scale. The first is an area in North Central Texas consisting of sixteen counties extending from Montague County on the Red River in the north to Brown County in the south and known as the Western Cross Timbers and Associated Interior Prairies. The other region is the East Texas Timber Country and Flatwoods Region, comprising thirty counties lying along the eastern border of the State and extending from the Red River to the Gulf Coast Prairies (see Fig. 1).

In North Central Texas the peanut soils are the Windthorst Fine Sandy Loam, Nimrod Fine Sand, Kirvin Fine Sandy Loam, and the Teller Fine Sandy Loam. These soils consist of sandy loam top-soil ranging from a brownish-gray to reddish-brown in color from 6 to 12 inches deep and underlaid with a clay subsoil. These soils are well drained, and, being to some extent drouth-resistant, are therefore the most desirable soils in the region. In 1925 Comanche County planted 14,695 acres and Eastland County 5,641 acres in peanuts, being the largest acreages planted in any counties in the State.

The soils of the region in Eastern Texas on which peanuts are grown, are the fine sands and fine sandy loams of the Orangeburg, Ruston, Kirvin, Caddo, Nacogdoches, Bowie, and Susquehanna series. These soils range from a gray to a red color for the topsoil, which ranges from 8 to 14 inches in depth, and is underlaid with clay subsoils, either mottled, yellow, or red in color. These soils have good drainage, are easily cultivated, and respond well to commercial fertilizers. In the southern end of this region, the soils on which peanuts are grown, are largely fine sands and fine sandy loams of the Norfolk, Susquehanna, and Bowie series. They have a gray top soil ranging from 6 inches to 2 feet in depth, and are underlaid with a yellow sandy clay subsoil.

Owing to the high annual rainfall and comparatively smooth-to-flat surface of considerable areas in the southern or Flatwoods section, the drainage is often inadequate.

As a rule, these soils have a low percentage of organic matter, but respond very well to good cultural methods, which include the incorporation of organic matter and also the use of manure and certain commercial fertilizers where good drainage is secured.

VARIETIES

There are a number of distinct varieties of peanuts, some of which have large pods, while others have from medium to small pods. The varieties having smaller-size pods appear to be better adapted to Texas conditions than the other varieties.

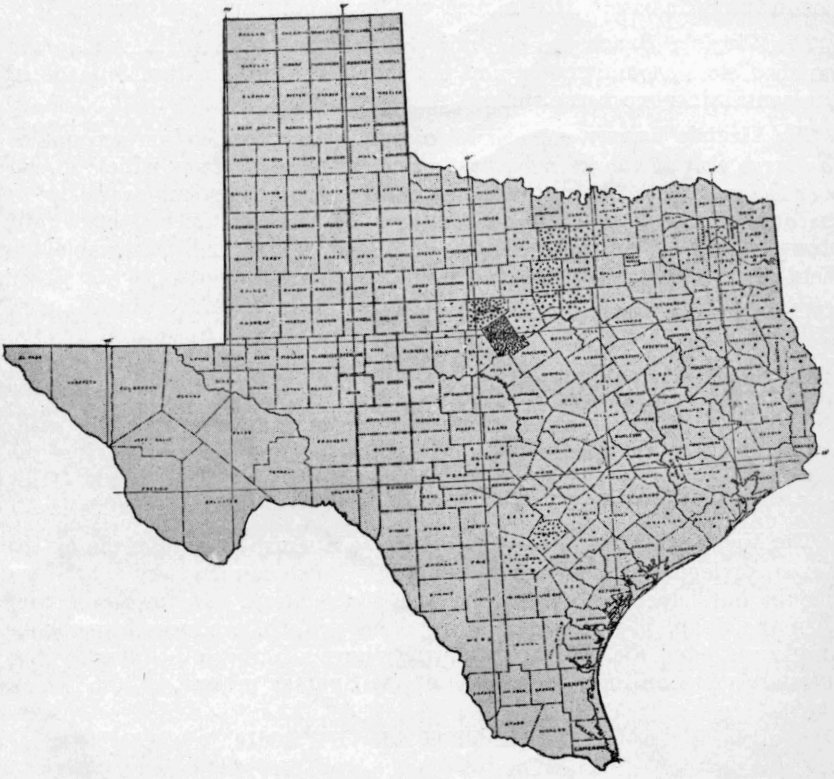

Fig. 1.—Peanut acreage in Texas, from 1925 Census. One dot equals one hundred acres.

The Spanish is the most commonly grown commercial variety. The stems have an upright growth and are a little coarser than the stems of the Runner types. The pods are small, usually containing two kernels of a light brown color, and are formed in a cluster close around the base of the plant, and adhere well to the plant during digging. On account

of its upright growth and rather heavy foliage, this variety produces a good yield of hay, which is easily mowed.

The Tennessee Red is grown to a limited extent for home consumption. On account of the bright red envelope covering the kernel, it is not considered desirable for milling purposes. This variety has a vigorous erect growth, with the pods clustered around the base of the plant, and is a good yielder of both nuts and forage.

The Valencia is a variety originally imported from Spain. It has a red envelope covering the kernel which is also not desirable for milling. This variety is a vigorous grower with erect vines and the nuts clustered close around its base. It is a good yielder of both nuts and forage.

The Virginia Bunch has an upright habit of growth; the pods are bunched close around the base of the plant, and are medium to large in size containing two kernels of a light brown color.

The Virginia Runner, sometimes known as the "Jumbo" on account of the large size of the kernels, has a rank growth of stems which spread over the ground. The nuts are distributed along the stems as well as at the base of the plant. The pods usually contain two kernels of a light brown color, but unless climatic conditions are unusually favorable the yield of nuts is not satisfactory on Texas soils.

The Carolina Runner is a rank grower with fine stems, which spread over the ground. It is a heavy yielder of nuts, the pods forming along the stems. The pod is medium in size and usually contains two and sometimes three kernels. The vines make fine hay of excellent quality. This variety will stay in the ground several months after ripening without damage to the pods, and is suitable for hog pasture during the autumn and winter months. On account of its spreading growth, this variety is more difficult to harvest than are the erect-growing varieties.

The Macspan peanut is a selection of the Spanish peanut, made by the Texas Agricultural Experiment Station. This peanut grows erect, having the nuts clustered around the base of the plant. It matures earlier than the Spanish, makes a more vigorous growth, produces larger pods and kernels and the nuts of this variety have a higher oil-content. The nuts are more uniform than those of the Spanish peanut.

PREPARATION OF THE SOIL

A well-prepared seedbed is necessary in order to obtain the best results with any of the varieties of peanuts. The soil should be plowed in the autumn or early winter and followed by disking and harrowing. If a late-planted crop of peanuts is desired, the soil can be planted to small grain for a winter pasture, which should be plowed under in the spring as a green manure crop, but if early planting of peanuts is desired, it is best to allow the soil to lie idle during the winter giving it

several harrowings in order to keep down any weed growth that may occur up to planting time.

It is preferred to flat-break the soil, rather than to bed, although, under certain conditions and in some types of soil, low flat beds can be made, and the kernels planted in the water furrow, and covered with two light furrows.

When the nuts are planted on flat-broken land, the furrows are opened, either thirty inches or thirty-six inches apart, with a straight shovel plow and the kernels planted in the furrow.

Since the roots of the peanut do not spread far from the row, commercial fertilizer is best applied in the furrow before planting, and can be distributed by either a one-horse or two-horse distributor. Superphosphate or superphosphate and potash are used as fertilizers for peanuts.

Well rotted stable manure may be applied at the time the soil is being prepared, but it is considered best to apply manure to some crop in the rotation, rather than directly to the peanut crop. Stable manure, especially if fresh, should not be used at planting time, as it is apt to produce a large number of immature pods or "pops."

TIME OF PLANTING

Peanuts are planted when danger of late frost is over, and the temperature of the soil warm enough for germination of the seed. From the middle of March to the middle of July are the extreme limits of the planting season.

The most favorable time for planting is April and May, as during these months the soil and climatic conditions are more favorable for plant growth than either earlier or later plantings.

June and July plantings are usually made following a crop of small grain, and unless the moisture content of the soil is maintained by evenly distributed rainfall through the growing season, the yields will be lighter than those of earlier plantings. In fact, summer drouths are common, and such late plantings are frequently not successful. As with most field crops, moisture is the controlling factor in the production of peanuts, more especially with plantings following small grain.

PREPARATION OF SEED

Peanuts can be prepared for planting by hulling, by cracking the hulls, or they can be planted whole. In the eastern part of the State, which is heavily timbered, it is best to either crack or shell the peanuts before planting; otherwise a large part of the stand will be destroyed by birds while the plants are emerging from the soil. Breaking the pod into two pieces will give practically the same results as hulling. A one-year experiment at Substation No. 11, Nacogdoches, shows only a slight difference in the yields of nuts and forage between the cracked hull, and the whole hull, in the thirty-six-inch rows, while with the eighteen-inch

rows, the same yields were obtained from both methods of preparing the seed.

Table 2. A comparison of two methods of preparing seed. Yields are reported as bushels of nuts and tons of forage, Substation No. 11, Nacogdoches.

Method of Preparing Seed	36-inch Rows		18-inch Rows		Average	
	Nuts	Forage	Nuts	Forage	Nuts	Forage
Not hulled	34	1.57	37	1.53	35.5	1.55
Cracked hull	36	1.60	37	1.53	36.5	1.56

In hulling peanuts for seed, care must be taken not to injure the testa or thin skin that surrounds each seed or kernel.

Peanuts may be hulled several months before planting without decreasing their power of germination, providing the hulled seed is stored in galvanized cans or other containers to avoid injury to the skins.

When planted in the hull, it requires from thirty to thirty-five pounds of seed to plant an acre, using a thirty-six-inch row, while the same amount of land can be planted with twenty-two pounds of hulled seed.

In the cooperative experiments of the U. S. Department of Agriculture, with the South Carolina Agricultural Experiment Station, the following conclusions appear in Department Bulletin No. 1478, "Time of Shelling Seed on Peanut Yields":

"There is no consistent decrease in the germination of the seed or in the yield of peanuts obtained from seed shelled several months before planting time, as compared with the germination and yield from seed shelled shortly before planting. It should be remembered that all the seed used in the three years' work was stock resulting from several seasons' selection for vigor and productiveness, and that the shelling was done by hand, no damaged kernels being allowed to remain in the lots prepared for planting.

"The seed was stored where it was not subjected to sudden or marked changes in temperature and where the moisture conditions were reasonably constant.

"When shelling is done some time in advance of planting time the utmost care should be exercised and the shelled seed stored in a dry moderately cool place. Large galvanized ash cans with lids offer good storage for shelled seed. Temperatures and moisture conditions similar to those of a living room were found to be well adapted to the storage of shelled peanut seed."

In order, however, to protect the testa from injury the hulling may be done best if labor is available just before planting.

METHODS OF PLANTING

Peanuts are planted both by hand and by machinery. When planted by hand, the pods or kernels are dropped at the desired distances in the

furrow, and are then covered by a small furrow, on each side of the row. Covering may be done with a cultivator fitted with two small plows, or with a cotton planter having the front plow removed, the small back plows and presser wheel covering the seed as well as regulating the depth at which it is desired to have them covered.

When planting is done by machinery, there is no need of opening a furrow as with hand planting, since all makes of planters are fitted with either a front plow or opening blade.

There are a number of makes of planters both riding and walking. Some are made especially for planting peanuts, while others are combination machines, using plates of special design for planting different crops (Figures 2, 3 and 4). Planters fitted with a concave wheel that follows the covering plows are preferred for planting peanuts, as this press wheel slightly rolls and packs the soil.

Peanuts are planted below the level rather than on beds or ridges, except where the land is low and poorly drained or other unusual soil and climatic conditions exist. The rows may be thirty or thirty-six inches apart.

RATE OF PLANTING

The distance between plants in the row depends upon the variety of peanut planted, fertility of the soil, and amount of rainfall. Experiments conducted with the Spanish variety at Substation No. 1, Beeville, and Substation No. 8, Lubbock, covering a period of five and seven years, indicate that close planting will produce higher yields of both nuts and forage than wide spacing as shown in Tables 3 and 4.

Table 3. Yield per acre in bushels* of nuts and tons of forage at different planting rates. Texas Substation No. 1, Beeville.

Inches Between Plants	1918		1920		1922		1923		1924	
	Nuts	Forage	Nuts	Forage	Nuts	Forage	Nuts	Forage	Nuts	Forage
3	.....	.....	.....	.....	37.6	.71	.....	1.76	.....	.....
6	17.0	1.22	.....	.....	.....	.....	.....	1.41	.....	.....
9	.....	.....	35.4	1.06	35.7	.64	.....	1.84	.....	.....
12	15.7	1.04	.....	.....	81.6	1.39	.....	1.01	.....	.....
15	.....	.....	32.7	.83	89.4	1.37	.....	.83	.....	.....
18	14.9	.83	27.2	.61	83.6	1.05	.....	.....	.....	.65
21	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
24	13.5	.43	26.8	.57	.....	.....	.....	.....	.....	.47
30	13.9	.66	.....	.30	.....	.....	.....	.....	.....	.39
36	13.6	.68	.....	.....	.....	.....	.....	.....	.....	.31

*Yield of nuts in this Bulletin are calculated at 30 lbs. per bushel for Spanish and Macspan and 22 lbs. for all other varieties.

A similar experiment was conducted by the U. S. Department of Agriculture in cooperation with the South Carolina Agricultural Experiment Station. In spacings varying from three to eighteen inches, the closer spacings produced the higher yields of nuts and forage, and the yields gradually declined as the distance between plants increased (U. S. D. A. Bulletin No. 1478).

Table 4.—Yields per acre in bushels of nuts and tons of forage at different planting rates. Texas Substation No. 8, Lubbock.

Inches Between Plants	1919		1920		1921		1922		1923		1925		6-Yr. Average	
	Nuts	Forage	Nuts	Forage	Nuts	Forage	Nuts	Forage	Nuts	Forage	Nuts	Forage	Nuts	Forage
6.....	94.7	1.72	47.6	1.77	60.4	2.28	15.2	1.60	45.1	2.64	35.0	.68	49.6	1.78
9.....	84.4	1.52	45.6	1.55	51.1	1.74	16.6	1.44	40.2	2.84	35.0	.63	45.4	1.62
12.....	72.1	1.26	39.7	1.48	47.9	1.65	17.1	1.24	43.2	2.90	32.5	.60	42.0	1.51
15.....	61.8	1.25	31.1	.99	45.4	1.49	20.1	1.66	41.7	1.84	33.7	.49	39.8	1.20
18.....	53.5	1.06	32.7	1.14	31.6	1.10	15.7	.81	39.7	2.72	37.5	.72	35.1	1.34

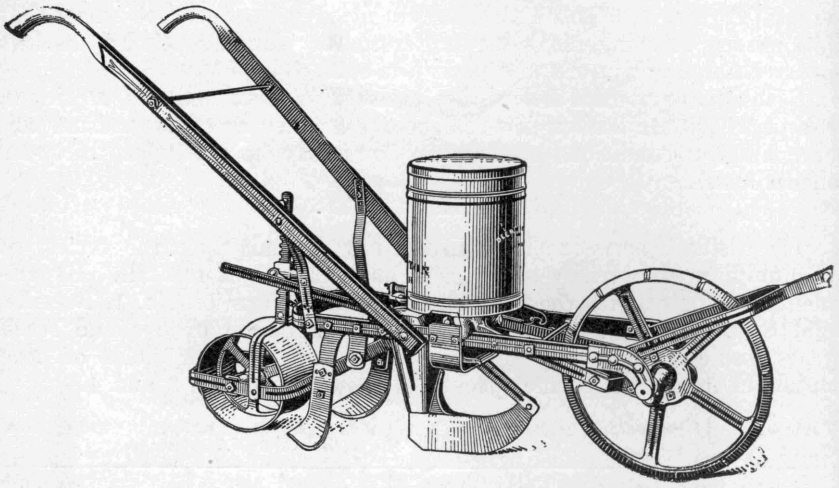

Fig. 2.—Combination walking planter, with peanut plates. Courtesy of John Deere Plow Co.

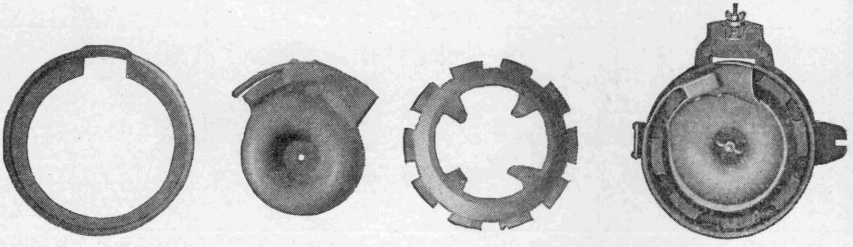

Fig. 3.—From right to left: unshelled peanut plate assembled, seed plate, cut-off, and false ring. Courtesy of John Deere Plow Co.

Experiments with Spanish peanuts were conducted at Substation No. 11, Nacogdoches, from 1914 to 1916, inclusive, to determine the effect of the width of the row upon the yield of nuts and forage. Eighteen- and thirty-six-inch rows were compared. The plantings were made each year in March, and normal stands of plants secured in April. The

yields of the 1916 test were reduced on account of damage by moles. Results of this experiment are reported in Table 5.

Table 5. Annual and average acre yields in bushels of nuts and tons of forage in 18- and 36-inch rows. Texas Substation No. 11, Nacogdoches.

Inches Between Rows	1914		1915		1916		Average 1914-16	
	Nuts	Forage	Nuts	Forage	Nuts	Forage	Nuts	Forage
36.....	36.3	.44	34.6	.80	19.3	.53	30.0	.59
18.....	36.0	.50	37.0	.77	23.0	.35	32.0	.54

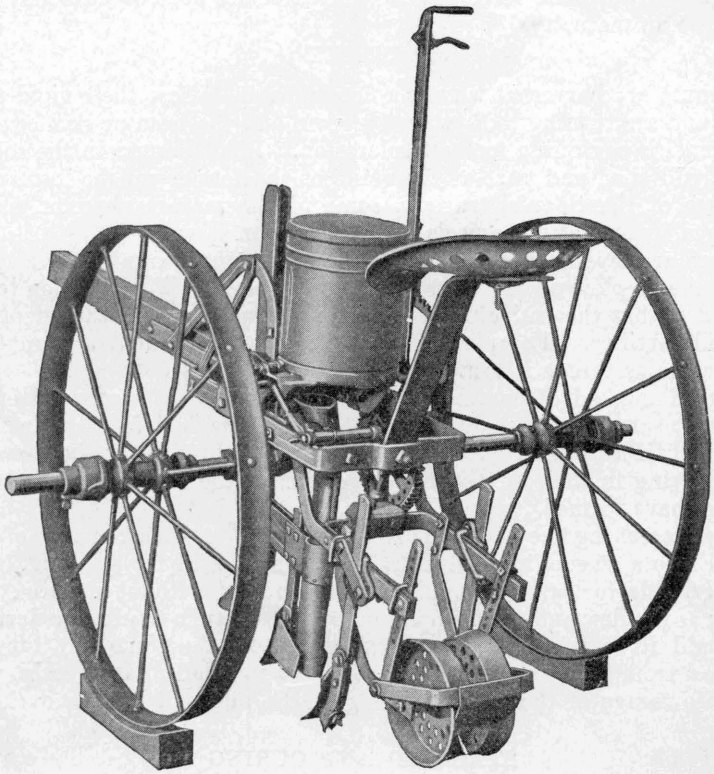

Fig. 4.—Combination riding planter, showing concave covering wheel. Courtesy John Deere Plow Co.

CULTIVATION

Cultivation should be begun as soon as the plants are up to a stand, and continued at intervals sufficiently frequent to keep down weed growth during the growing period of the crop.

Frequent shallow cultivation, similar to that given cotton, is an im-

portant factor in the production of high yields; and after rains, as soon as the soil is dry enough, the surface should be stirred with a cultivator fitted with sweeps or shallow cutting shovels. Cultivation should continue until the plants begin pegging down. At this time, cultivation should stop, except that an occasional furrow should be run down the middle of the row with a sweep attached to a single-stock plow.

If the soil has been well prepared before planting, usually only one hand-hoeing will be necessary. The number of cultivations given will depend upon the climatic conditions during the growing season, and the rapidity of plant growth.

At every cultivation, soil should be brought towards the plants, in order to provide some loose soil in which the late pods or nuts may form and grow to maturity.

HARVESTING

Peanuts are harvested when the leaves begin to lose their vivid green color, and are turning to a yellowish green and the testa or skin covering the kernel is beginning to show coloration. If left longer in the soil the leaves will shed and part of the value of the forage will be lost and in the case of the Spanish variety, some of the mature peanuts may be damaged by sprouting, especially if the season is wet.

There are several methods in use for harvesting peanuts. A common practice is to plow up the vines with a small plow. The objection to this method is that the entire plant is removed from the soil, thus depleting the soil fertility. The plants become covered with dirt, and much of their value as forage is lost.

A good method of harvesting peanuts is to have a sharpened curved steel bar, somewhat similar to a heel-sweep, attached to a single stock. This will, if run shallow, cut off the tap root just below the bunch of nuts, leaving in the soil the greater portion of the root system on which nodules have formed.

After loosening the plants from the soil, they are shaken free of dirt, loaded into a wagon, and taken to the place selected for stacking. It is not advisable to leave the plants on the ground without stacking overnight; as the dew and atmospheric moisture will turn the forage dark.

Should it be impossible to stack the plants the same day they are loosened from the soil, they should be placed in small piles or cocks, when only the forage of the outside plants in the pile will become darkened.

STACKING AND CURING

Peanuts are cured by placing the plants in small stacks around poles set in the ground. The poles are about four inches in diameter at the base, and about six feet high.

Cross pieces about 24 inches long are nailed at the base of the pole, so that they will be about six inches above the surface of the ground when the pole is set in position (Figure 5). These cross pieces can be

made from any waste lumber or from smaller poles or tree limbs. They are nailed at right angles so as to form two equal arms on the main pole.

The place selected for stacking should be convenient for the threshing machinery, or the peanuts can be stacked in rows over the field in which they are grown. After curing, the stacks can be taken up intact and hauled to the thresher.

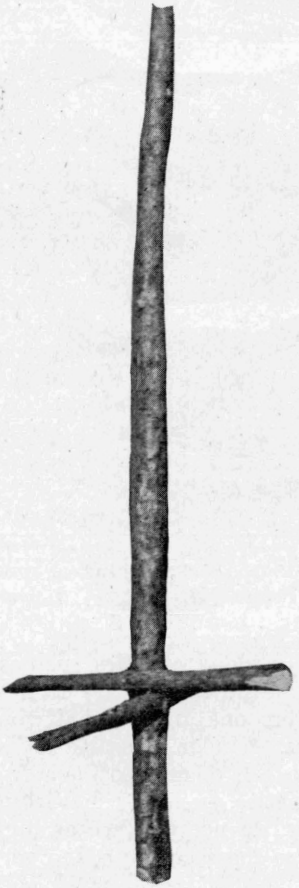

Fig. 5.—Showing construction of cross arms on pole used for stacking peanuts.

Peanuts are stacked around the pole with the forage outside, and the nuts towards the center. With the Spanish variety, the stacks may be made by piling the plants in two rows around the lower part of the stack, thus giving it a wider base; but if the vine growth is heavy, as with the Tennessee Red, or Valencia varieties, it is best to pile the plants in single rows around the poles, pressing them down while stacking, and

occasionally dividing a bunch around the pole in order to bind the stack together.

As the stack nears completion, it should be drawn in towards the pole and the top capped with a cock cover. If these are not available, old fertilizer or feed sacks will answer the purpose; otherwise the birds will destroy many of the nuts in the stack before they are cured enough for threshing (Figure 6).

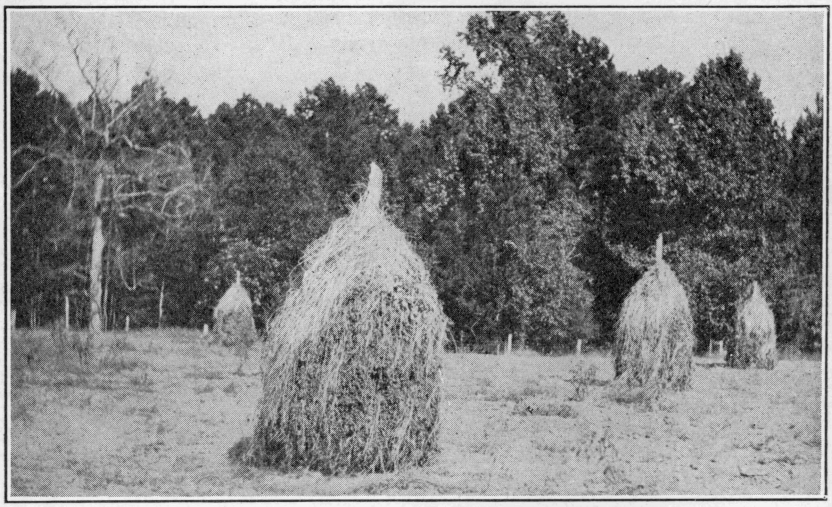

Fig. 6.—Method of stacking and curing peanuts.

YIELDS

The yields of the small-podded varieties, such as the Spanish, Valencia, and the Tennessee Red peanuts, will vary from twenty-five to fifty-five bushels of nuts, and from one and one-half tons to two and one-half tons of forage to the acre. Under favorable soil and climatic conditions, yields of one hundred bushels of nuts to the acre have been obtained.

The large-podded varieties, such as the Virginia Bunch and the Improved Virginia Runner, do not produce as high yields, except in the coastal plains area, where these large podded varieties have given satisfactory yields.

Yields will vary with the season, and the fertility of the soil. The peanut if grown continuously on land with both the forage and nuts removed, will soon deplete the soil of organic matter, resulting in greatly reduced yields. It is important, therefore, to use some system of rotating this crop with other crops on the farm, as greater yields can thus be obtained without additional work.

In experiments conducted at the Beeville Station, to determine the

effect of rotation on yield of peanuts, it was found that peanuts in rotation produced 1008 pounds more cured forage to the acre, than peanuts continuously planted upon the same land.

Variety tests, in which both nut and forage yields were recorded, have been conducted at six of the Texas Substations. Results of these tests are summarized in Table 6.

Table 6.—Average yield per acre in bushels of nuts and tons of forage of peanut varieties tested at five substations in Texas.

Station	Years Tested	Spanish		Tenn. Red		Valencia		Va. Runner		Va. Bunch	
		Nuts	Forage	Nuts	Forage	Nuts	Forage	Nuts	Forage	Nuts	Forage
Beeville	1	46.12	2.79	24.84	2.41	28.40	2.72	37.91	2.50	18.57	1.86
Troup	8	34.52	1.39	23.79	1.16	54.60	1.70	28.52	1.35	.....	.....
Angleton	10	53.52	1.56	*30.37	*1.54	46.21	1.14	.....	.....	64.27	1.07
Lubbock	1	23.30	.35	21.82	.33	.....	.....	22.73	.30	21.36	.18
Nacogdoches	1	.....	2.18	.....	1.89	.....	.....	.....	1.93	.....	1.52

*4 years.

The results of this test indicate that both the Valencia and Spanish varieties are adapted to all sections of the State. Although the Valencia produces slightly higher yields than the Spanish, it is adapted for home and confectionery use only, as the red color of the testa covering the kernel is objectionable to the oil mills.

The Virginia varieties, both the bunch and runner types, appear better adapted to the Gulf Coast region, where both varieties produce satisfactory yields.

FEEDING TO LIVESTOCK

Although peanut forage, when properly cured in the stack, contains almost the same feeding value as clover and alfalfa hay, it is not considered a very satisfactory feed for horses or mules on account of the amount of dirt and dust contained. However, it can be fed in limited quantities to horses and mules when racks or wire-bottom mangers are used, so that the sand and dust will sift through.

The amount of dust and sand contained in peanut forage, depends upon the type of soil upon which the peanuts are grown, the method of harvesting, and the climatic conditions at the time of harvesting and threshing. Peanuts grown upon a light sandy soil produce cleaner forage than those grown upon the heavier and darker soils.

Peanut forage is considered an excellent feed for cattle, and is preferred by some dairymen to other hays for feeding cows in milk. When grown for this purpose, the vines are usually mowed off and cured in stacks, while the nuts are left in the ground for hogging-off.

The chemical composition of peanut forage as compared with other Texas feeds is shown in the following tables:

Table 7.—Percentage composition and feeding value of peanuts and other feeds.

	Protein	Ether Extract	Crude Fiber	Nitrogen Free Extract	Water	Ash	Digestible Protein	Productive Value
Peanut hay, mowed	11.09	5.09	21.94	42.11	10.00	9.77	7.10	10.9
Peanut hay without nuts	9.55	3.08	24.30	45.33	9.50	8.24	6.11	10.6
Peanut hay with nuts	13.22	13.12	23.75	34.95	8.19	6.77	10.00	15.6
Alfalfa hay	14.76	1.93	28.42	37.35	9.12	8.39	11.00	8.7
Bermuda hay	7.17	1.75	24.90	49.39	8.87	7.92	3.70	7.3
Prairie hay	4.38	2.13	28.97	48.79	8.16	7.57	0.50	7.1
Ground rough rice	8.09	1.80	8.89	64.52	11.68	5.02	6.10	15.9
Wheat bran	16.59	4.03	8.84	54.87	9.86	5.75	12.50	12.0

Texas Agricultural Experiment Station, Bulletin No. 222.

Table 8.—Composition of peanut kernels and peanut meal.

	Protein Per Cent	Ether Extract	Crude Fiber	Nitrogen Free Extract	Water	Ash
Peanut kernels	29.45	48.89	2.67	11.87	4.88	2.24
Peanut meal	44.91	8.84	12.08	23.05	6.22	4.83

Texas Agricultural Experiment Station, Bulletin No. 222.

Table 9.—Composition of peanuts and peanut products.

	Protein	Ether Extract	Crude Fiber	Nitrogen Free Extract	Water	Ash
Peanuts in hull	25.54	36.63	17.34	12.07	5.65	2.77
Peanut kernels	29.45	48.89	2.67	11.87	4.88	2.24
Peanut cake, high grade	49.50	11.40	5.90	22.10	6.10	5.00
Peanut cake, low grade	44.90	8.80	12.10	23.10	6.20	4.80
Pressed kernels	58.78	6.00	4.48	17.38	9.18	4.18
Hulls	6.76	1.10	60.83	19.64	7.48	4.19

Texas Agricultural Experiment Station, Bulletin No. 222.

Peanuts are not considered a good feed for hogs that are to be sold to the packing trade as they frequently have a tendency to produce a condition known as "soft pork." They are fed to some extent in Texas and other southern states to hogs that are to be killed for home consumption.

In the jointly conducted pork investigations between the U. S. Department of Agriculture, the Texas Agricultural Experiment Station, and other Southern Stations, from July 1, 1919, to June 30, 1924, the following conclusions appear in Department Bulletin No. 1407, "Some Results of Soft-Pork Investigations":

"Peanuts grazed or self-fed with or without supplementary minerals for a period of sixty days to pigs starting at approximately 100 pounds in weight, produce soft (or oily) carcasses. It is impossible to produce hard carcasses by feeding corn and tankage, or corn and cottonseed meal to such soft hogs for a subsequent period of sixty days, although the soft hogs are made firmer by subsequent feeding of hardening feeds.

"Hardening on corn and non-softening supplements proceeds more slowly than softening on peanuts. With pigs starting at approximately 100 pounds initial weight it appears to require about three times as much gain on corn and non-softening protein supplements as previously made on peanuts to produce hogs of a moderate degree of firmness."

Peanuts contain a high per cent of protein and when fed, should be mixed with other feeds rich in starch. The following table shows the feeding values of Texas peanut products per 100 pounds:

Table 10.—Feeding values of peanut products per 100 pounds.

	Productive Value	Digestible Protein
Hulls, hand separated	.....	4.1
Hulls, commercial	1.7	5.0
Peanut cake, choice (average)	20.3	42.6
Peanut cake, prime (average)	17.3	38.6
Whole pressed peanuts (average)	24.6	20.6
Whole peanuts, highest in fat	26.3	20.9
Whole peanuts, lowest in fat	22.7	19.9
Whole peanuts, highest in fiber	22.8	19.5
Peanut hay, mowed	10.9	7.1
Peanut hay, no nuts	10.6	6.1
Peanut hay, with nuts	15.6	11.0

Texas Agricultural Experiment Station, Bulletin No. 222.

MARKETING

In the peanut-producing regions of Texas, the crop is usually sold to the local oil mills, agents of outside milling interests, or to jobbers.

The customary or trade weight per bushel is 30 pounds for Spanish peanuts, and 22 pounds for other varieties. Peanuts are usually sold in sacks containing about two bushels, and are delivered to the buyer as they come from the thresher, no grading or re-cleaning being done by the farmer.

Prices vary from season to season, according to the size and quality of the crop and market demands.

The Bureau of Agricultural Economics, U. S. Department of Agriculture, recommends the following grades for marketing shelled white Spanish peanuts, U. S. Department of Agriculture, Circular No. 304:

U. S. No. 1. Shall consist of shelled white Spanish peanuts, which are whole and free from small shriveled or noticeably discolored peanuts, and from unshelled, damaged, or moldy peanuts and foreign material.

U. S. No. 1. Splits. Shall consist of shelled white Spanish peanuts, which may be split or broken, but which are free from small shriveled or noticeably discolored peanuts, and from unshelled, damaged, or moldy peanuts and foreign material.

U. S. No. 2. Shall consist of shelled white Spanish peanuts, which may be split or broken, but which are free from small shriveled or noticeably discolored peanuts, and from unshelled, damaged, or moldy peanuts and foreign material.

In order to allow for variations incident to proper grading, and handling, No. 1 must not contain more than 1 per cent by weight of other varieties; not more than 2 per cent of split or broken kernels; not more than 2 per cent of small shriveled peanuts; not more than ½ per cent of damaged or ¼ per cent of foreign material.

The U. S. No. 1 Splits must not contain more than 1 per cent of other varieties or more than 10 per cent of whole peanuts; not more than 2 per cent of small pieces; and the same amount of damaged and foreign material as in the No. 1 grade.

U. S. No. 2 grade allows the same percentage of other varieties as the other grades, with not more than 6 per cent of small pieces of peanuts, or small shriveled peanuts; and the same percentage of damaged and foreign material as in the other grades.

These grades have been adopted by the Food Products Inspection Service of the Bureau for the inspection of white Spanish peanuts in all terminal markets of the country.

IMPROVEMENT OF THE SPANISH PEANUT

Little work has been done to increase the yields and quality of the Spanish peanut by pure line selection, progeny test, or even mass selection of promising plants.

This may be accounted for by the small importance placed upon the Spanish peanut as a commercial farm crop. It is only within the past ten years that this variety of peanut has attained commercial importance in Texas.

Work towards the improvement of this variety of peanut was begun in 1917 at Substation No. 11, Nacogdoches. Five hundred and eleven individual plants were selected from a three-acre field planted on that station, and records kept upon the behavior of their progeny. The object was to produce a strain of Spanish peanuts which would produce higher yields, more uniform nuts, and a higher oil-content of the nuts. Each year the poorer strains were discarded. Selections were made from these and the better ones retained every year up to 1922 when only 16 of the original strains remained.

The laboratory work in making the chemical analysis of the large number of sample kernels was made under the direction of Dr. G. S. Fraps, Station Chemist.

The average percentage of oil in 62 selections of Spanish peanuts analyzed in 1918 was 48.69 while the highest was 51.3 and the lowest 46.19. The percentage of oil in the commercial Spanish peanuts runs around 43 to 45.

The strain finally chosen as the best and named Macspan (see Fig. 7) had an oil-content of 49.18 per cent. This new variety also produces larger and heavier nuts than the Spanish and as shown by Table 11 averaged in 1927 at College Station practically 18.7 per cent heavier nuts than the Spanish.

Table 11.—Size of nuts of Spanish and Macspan varieties of peanuts as shown by the weight in grams of 25 lots of 100 whole peanuts. College Station, 1927.

Lot Number	Little Spanish	Macspan
	Grams	Grams
1	84	99
2	83	96
3	82	96
4	87	90
5	85	95
6	84	94
7	87	98
8	73	115
9	87	99
10	81	96
11	83	100
12	82	91
13	84	92
14	74	99
15	95	100
16	80	92
17	75	95
18	83	100
19	83	91
20	82	92
21	84	100
22	81	94
23	80	100
24	85	99
25	75	101
Average	82.36	97.76
Per cent increase		18.69

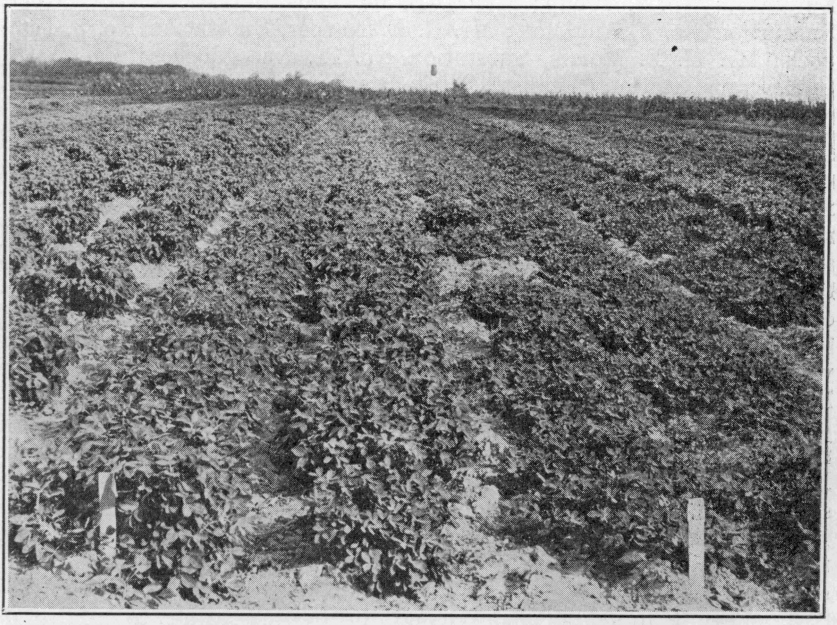

Fig. 7.—The two rows at the left are the new Macspan peanut compared with two rows of the common Spanish variety on the right. College Station, 1927.

That the Macspan is more productive than the Spanish is shown by a comparison of their yields in experiments conducted at Nacogdoches in 1927, and reported in Table 12, showing an increase of approximately 20 per cent in the acre-yield in this test for one year. Small lots of this new variety have been distributed to peanut growers in the state and the supply is being further increased in order that it may be available in quantities for commercial production in the more important peanut regions of Texas.

Table 12.—Comparative yields of three plantings of Little Spanish and Macspan peanuts Grown at Substation No. 11, Nacogdoches, 1927.

Variety	Bushels to the Acre				Per Cent Increase
	First Planting	Second Planting	Third Planting	Average	
Little Spanish	15.4	18.1	23.5	19.0	.....
Macspan	19.8	27.9	23.0	23.5	23.68

ACKNOWLEDGMENTS

The author is indebted to the following superintendents and former superintendents of Texas Substations for the experimental data reported in this Bulletin:

Mr. R. A. Hall, Substation No. 1, Beeville; Mr. W. S. Hotchkiss, Substation No. 2, Troup; Mr. E. B. Reynolds and Mr. V. E. Hafner, Substation No. 3, Angleton; Mr. R. E. Karper, Substation No. 8, Lubbock; Mr. H. F. Morris, Substation No. 11, Nacogdoches; and to Dr. G. S. Fraps, Station Chemist, College Station, for chemical analyses.

SUMMARY

1. Texas annually grows about 70,000 acres or about one and one-half million bushels of peanuts with a total value ranging from one to two million dollars.

2. In Texas, peanuts are grown mainly in a region comprising sixteen counties in the north-central part of the State and another in the eastern part comprising 30 counties.

3. The Spanish peanut is the most commonly grown commercial variety in Texas. The Tennessee Red is grown to a limited extent for home consumption.

4. Peanuts should be planted in rows 30 to 36 inches apart and below the level rather than on beds except where the soil is poorly drained. No marked differences were obtained from planting shelled and unshelled seed.

5. Experiments on rate of planting indicate that closer planting, from three to six inches in the row, gives higher yields than wider spacing.

6. Peanut forage is about equal, in feeding value, to alfalfa or

clover hay. In order to preserve the full value of the forage and insure a high grade of nuts, the crop should be harvested at the proper time and well stacked to avoid weather damage.

7. Variety tests conducted at six different points in Texas show the Spanish to be the most productive variety except in the Gulf Coast Region, where some of the large-podded varieties made higher yields.

8. A new variety, named Macspan, has been developed by the Texas Station through selection from the Little Spanish. The new variety is more vigorous in growth, produces higher yields, and bears larger and more uniform pods. This variety is being increased and distributed to Texas farmers.